

REMARKS

The foregoing amendments in claim 1 define the invention with enhanced specificity to distinguish clearly over the prior art.

As noted previously, the present invention relates to a submount for a light emitting/receiving device that has a light-passing opening from a device-side to an outer, previously opposite side. As amended previously, claim 1 is directed to features best seen in Fig. 7B that ensure that a brazing material that adheres the device to the submount does not adversely affect a reflective layer in the opening in the substrate extending from the light emitting device to the opposite side of the substrate from the device.

The present invention claims define the structure shown in Fig. 7B with enhanced specificity that expressly states features not disclosed or suggested by the prior art. The inner end portion (42) of the electrode of the submount is now specified as being laterally spaced from the device side opening 31, as shown in Fig. 7B and as described at page 27, lines 15-22 of the specification. This inner end electrode portion, however, does not extend laterally beyond the dielectric film surrounding the device side opening, also as shown in Fig. 7B and described at page 27, line 15-22.

The amendments in claim 1 also specify that the submount includes a layer of a brazing material disposed between the device and the electrode that secures them together. This brazing material, when molten, does not extend to the device-side opening. The lateral spacings of the inner end portion and the dielectric film, as claimed, prevent the brazing material from reaching the opening.

Finally, claim 1 is amended to specify that the openings are both open to the overlying device. This makes it explicit that there is an open flow path for the brazing material to the reflecting surface of the hole between these openings. Molten brazing material, but for the claimed structure of this invention, could therefore flow to the hole, where it could interfere with functioning of the reflective surface.

Applicant respectfully traverses the rejection of claims 1-3 and 7 under Section 102(e) as fully anticipated by U.S. Patent No. 6,898,340 ("Tanaka").

As noted previously, Tanaka describes a monocrystalline silicon substrate 20 for an LED 10 formed as a GaN-based semi-conductor laminate 40 in a depression 21 on a face 20a of the submount. The focus of Tanaka is that one can use a silicon substrate as a base for a GaN semiconductor diode despite the light-impervious nature of silicon (Tanaka, Col. 1, lines 52-55). An opening 31 extends from face 20a (at the depression 21 and the LED 10) to the opposite face 20b with a frusto-conical shape, one widening toward face 20b. In Tanaka, the LED 10, 40 is positioned over and blocks the mouth 31a of the opening 31 at face 20a. Also, in Tanaka, there is no brazing material near the opening 31 at the mouth 31a. Also, while Tanaka has an electrode and an insulating layer near the mouth 31a, they are spaced vertically over it, with the device 40 in between.

Turning to Applicant's claim 1, as amended, the dielectric film is formed on the mounting surface which surrounds the device-side opening, an electrode is formed on the dielectric film, and an inner end portion of the electrode is spaced laterally at a specified distance from the device-side opening, but it does not extend beyond the dielectric film surrounding this opening. Because the inner portion of electrode is so spaced, the dielectric film is exposed around the device-side opening, as best seen in Fig. 7B, and discussed on page 27, lines 16-19 of the specification. These features are not present in Tanaka.

Amended claim 1 also includes a brazing material layer disposed between and securing the device to the inner end portion of the electrode. Amended claim 1 also specifies that the reflecting surface (metallic layer 5 in Fig. 7B) of the hole between the openings is also open to the device, with the device spaced over the device-side opening. This is also not taught or suggested by Tanaka.

As noted in the previous response, the brazing material has poor wettability to the dielectric film of SiO₂ which has a hydrophilic property. However, even if the brazing material gets into touch with the dielectric film of SiO₂, the construction defined

by amended claim 1 prevents the adhesive material from flowing or diffusing into the reflecting surface (5) via the device-side opening. The lateral spacing of the inner end portion of electrode at a specified distance from the device-side opening operates, and greater than the spacing of the dielectric film from the opening, creates this result.

These claimed structural features of amended claim 1 prevent the contamination of the reflecting surface and therefore any resulting decrease in reflectivity of the reflecting surface. These structural features of amended claim 1 and the effects of these features discussed above are neither disclosed nor suggested by the cited reference US 6,898,340 to Tanaka, whether taken alone or in any combination with the other art of record.

Applicant withdraws any argument that the resin in the Tanaka opening would diminish heat transfer. A light transmissive resin with acceptable heat conductivity characteristics could be used in Tanaka.

In view of these amendments, Applicant believes that all of the remaining, pending claims 1-3 and 7 are clearly patentable over the art of record, and that this application is otherwise in condition for allowance.

This Amendment is being submitted with, and supports, a Request for Continued Examination (RCE).

Favorable action on the RCE and the allowance of the pending amended claims is solicited.

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In view of the above amendment, applicant believes the pending application is in condition for allowance.

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